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ABSTRACT

The focus of this study was on the effects which knowledge of semantic components may have on recall. It was hypothesized that after an introduction to discourse structures immediate recall would improve and recall which was delayed for one week would improve. Thirty-four unpaid volunteers between the ages of 16 and 26 were recruited and randomly assigned to an experimental and a control group. Twenty-three of the subjects were high school advanced placement students. Seven semantic categories were taught to each subject in the experimental group: agent, instrument, location, benetive, factitive, and essive. Subjects then read passages of about 330 words. The results indicated that immediate recall scored for idea units was insignificantly better for the experimental group when compared with the untutored control group. One week delayed recall significantly favored the experimental group. The results were considered important for psycholinguistic theory and for education. (WR)

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The effect of knowledge of discourse structures on reading recall[1,2]

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ABSTRACT

High school and college subjects were introduced to seven semantic role categories, such as "agent," "patient," and "instrument." Knowledge of these categories was expected to aid the subjects' understanding and recall of textual information. Subjects were asked to read passages of about 330 words. Immediate recall, scored for "idea units" (essentially clauses), was insignificantly better ($t = 0.874$, $p < 0.20$) for the experimental group when compared with an untutored control group. One-week delayed recall significantly favored the experimental group ($t = 2.01$, $p < 0.05$). The results were considered important for psycholinguistic theory and for education.

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Traditionally, linguists have concentrated their research efforts in the area of syntax, using the sentence as the largest unit for linguistic analysis. Since the 1950's, and especially since the mid-1960's, linguistic sentence analysis has increasingly concerned itself with semantic roles and relationships (e.g., Fries, 1952, pp. 173-201; Pike, 1954, p. 131; Pike, 1967, p. 246f; Weinreich, 1966; Halliday, 1967; Chafe, 1970a, 1970b). The real impetus for the study of semantic roles came from Fillmore's (1968) case grammar of sentences, in which he identified such roles as agent, instrument, and location. More recently, the study of semantic relationships and case grammar has expanded from the realm of sentence analysis to the realm of prose analysis. Grimes (1972, pp. 146-166), for instance, has identified eleven semantic roles, such as agent, patient, experiencer, and instrument, which are relevant for analyzing and understanding discourse.

Relatively little psycholinguistic research has been done concerning the relationship between semantic structures and recall or comprehension. Studies of the relationship between meaning and the recall of sentences in isolation indicate that memory is primarily semantic rather than phonetic (Bobrow, 1970), and that the ability to recover the underlying

meaning of the sentence is more important to comprehension than are a person's IQ, word knowledge, or word recognition skills (Simons, 1970). It has been found that semantic roles are important factors in predicting recall (Anderson and Bower, 1971), recognition (Shafto, 1973), and comprehension (Suci and Hamacher, 1972) of sentences in isolation.

Research using sentences in prose contexts has found that semantic memory is much better than syntactic memory (Blount and Johnson, 1973; Jarvella, 1971). Memory for syntax is poor (Paris and Carver, 1973), except for the most recently heard sentences (Jarvella, 1971). Within 30 minutes syntactic memory is only at a chance level, whereas semantic memory is still above the chance level after one week (Perfetti and Garson, 1973). This semantic memory has been described as a constructive or reconstructive process (Blount and Johnson, 1973; M. Johnson, et al., 1973; Paris and Carter, 1973). An experiment which tested the units involved in the comprehension of sentences in text found data which favored a semantic case-grammar interpretation rather than a syntactic surface-grammar interpretation of comprehension (Garrod and Trabasso, 1973).

Studies of prose memory and comprehension, like the studies of sentences in isolation and in prose contexts, suggest that the units of memory are abstract and do not directly reflect the surface structures of text. Pompi and Lachman (1967), before the advent of case grammars, spoke of "surrogate structures" composed of "themes, images, schemata, and words." Kintsch and Monk (1972) gave evidence that information from simple and complex versions of a passage is stored in essentially the same form. This evidence for an abstract representation of meaning is

consistent with an interpretation of meaning in terms of underlying semantic relationships.

Although there is evidence for semantic components in prose learning, reports of studies dealing specifically with case-like units are rare. Meyer (1971; Meyer and McConkie, 1973) found that the recall of her "idea units" was affected by the logical structure of these units in prose passages. It is significant that Meyer's "idea units" can be assigned to role categories similar to those identified by Grimes (1972).

It is possible that teaching role categories to readers could improve recall by improving comprehension[1]; what the linguist has found useful for describing language, the reader may find useful for understanding language. Meaningfulness is known to affect recall (R. Johnson, 1973; Miller and Selfridge, 1950), so improving meaningfulness may improve recall. Knowledge of semantic components may also help the reader "chunk" information across larger categories than clauses and sentences. Such chunking should decrease the memory load (Miller, 1956); it is easier to remember the principle agent in a passage than to remember the grammatical subject of each sentence in that passage. Comprehension has been equated with stored information (Carver, 1973);

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1. If readers were to learn role categories, the category names might operate as cues or labels in facilitating recall. Associative cues and labels improve the recall of word lists (Buscke and Lazar, 1973; Dale and McGlaughlin, 1970; Thomson and Tulving, 1970; Tulving and Osler, 1968). In paired-associate learning, sentence contexts provide case relations which improve the learning of noun pairs (Ehri, 1972). For prose learning it has been suggested that "an abstract representation of a passage's central meaning" may itself serve as a mnemonic in remembering the passage (Dooling and Lachman, 1971, p. 216). Thus one might expect that role categories could serve as cues or labels. There is, however, little relevant data on the cued recall of prose.

and improved comprehension may result in better recall (Carroll, 1972, p. 7; Miller and Selfridge, 1950). In short, knowledge of semantic structures might be expected to improve the meaningfulness or comprehensibility of discourse and thus result in better recall.

The focus of the current study is on the effects which knowledge of semantic components may have on recall. It was hypothesized that after an introduction to discourse structures:

1) immediate recall would improve, and

2) recall which was delayed for one week would improve.

A measure of delayed recall was included because it was thought that recency effects might mask the experimental results for immediate recall.

Methods

Thirty-four unpaid volunteers were recruited during summer session at Cornell University and were randomly assigned to experimental and control groups. Twenty-three of the subjects were high school advanced placement students. Ages ranged from 16-26. Subjects were run individually. Five subjects (3 experimental and 2 control) did not return for delayed recall after one week.

Five reading passages, adapted from Scientific American, were presented in five different orders. The passages contained 331 to 336 words and 49 to 61 idea units. These idea units, essentially clauses, were agreed on by two judges.

Seven semantic categories, similar to Grimes' (1972) categories in discourse structures, were taught to each subject in the experimental group: agent (who or what caused the event), patient (who or what was

directly affected by the event), instrument (what was used to perform the event), location (where the event took place), benetive (who or what benefited or suffered from the event), factitive (what was the outcome of the event), and essive (what descriptions and identifications were given). These categories were introduced and illustrated to each subject in the experimental group after he read and recalled the first passage. The experimental subjects then read and recalled the second, third, and fourth passages; after each recall, the categories were again briefly illustrated with examples from the passage just recalled. The control group was not taught the semantic categories; instead, each control subject was asked to glance over the passage after recalling it. These control subjects were told that this "feedback" was intended to help them improve their recall of subsequent passages.

The fifth passages were then read by both groups but were not recalled immediately. The experimental subjects were not given illustrations of semantic categories from the fifth passages, nor were the control subjects asked to glance back over the fifth passages. All subjects were told that this final passage was timed in order to see how their practice with the earlier passages had affected their reading rates. Then they were asked for their ages and years in school and were asked to return in one week for a "similar session." On returning, each subject was asked to recall the fifth passage.

Results

Recall protocols were scored for presence of information from the idea units. The index of interest was the proportion of idea units

recalled. One fourth of the protocols were rescored after six months, giving a reliability coefficient of 0.97. The initial recalls, which were untutored for both the experimental and control groups, were scored to judge the initial equivalency of the two groups. The initial mean proportions were 0.311 for each of the groups.

Nonsignificant support ($p \angle 0.20$) for hypothesis 1 comes from a t-test ($t = 0.874$, $df = 32$) comparing the last immediate recalls (the fourth passages) in the experimental and control groups; the mean proportions were equal to 0.447 and 0.407 respectively. Significant support ($p \angle 0.05$) for hypothesis 2 comes from a t-test ($t = 2.01$, $df = 27$) comparing the delayed recall of the fifth passages; the mean proportions for the experimental and control groups were 0.219 and 0.137 respectively. As expected, immediate effects were not as strong as delayed effects, possibly because of masking by recency.

Discussion

The results of the present study provide further evidence for the psychological validity of case-like semantic units. Suci and Hamacher (1972), using subjects who were untutored in role categories, found that role categories affected the speed with which questions about sentence nouns could be answered. Shafto (1973), also using untutored subjects, found that a novel sentence was often "recognized" if the semantic relations of an earlier sentence were preserved. Thus, subjects might "recognize" the novel sentence "John borrowed $100 from the bank," if the sentence they had actually seen earlier was "The bank loaned John $100." In the current study, subjects were tutored in semantic role

categories, with the apparent result being an improvement in comprehension and recall.

The theory that verbal memory is reconstructive and based on semantic units (Blount and Johnson, 1973; James, 1973; Paris and Carter, 1973) is also supported by the current data. Introducing subjects to semantic components of discourse may have helped focus the subjects' attention on the units which are important in reconstructive memory.

The results also provide empirical support for theoretical models of discourse. A discourse grammar is important because it subsumes all other grammars and provides for trans-sentence relations (Sanders, 1970). Semantic categories need to be included in a discourse model not only because of their linguistic importance (Gulstad, 1973; Montgomery, 1972; Van Dijk, 1973), but also because of their psychological importance.

The experimental results, especially if supported by further research, suggest that students in reading programs and English courses may benefit from the teaching of discourse structures. These first results are very encouraging because the treatment was not very strong, i.e., subjects were barely introduced to discourse structures. Longer or more intensive tutoring might be expected to provide even clearer results.

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